point where a tangent drawn to the curve passes through the point of origin (see F. H. Knight, *Risk, Uncertainty and Profit*, page 100). Below this point, returns per unit of capital will be increasing, while beyond it they will be decreasing. Agriculture, therefore, occupies no exceptional place in the field of economic analysis.

Secondly, the main economic question is one of costs rather than returns, and the cost per unit of additional production may continue to fall for some time after the returns per unit to one of the factors have begun to diminish. This takes place because in the actual economic system, all of the factors of production are scarce, and not merely one of them (see Carver, *The Distribution of Wealth*, chapter on "Diminishing Returns").

Thirdly, to continue with our general analysis, we can say that at any instant of time, the whole of industry and agriculture is on the verge of increasing costs. The reason is that at an instant, or in a short period of time, the supply of factors of production is fixed, and expansion can only be undertaken by offering higher prices for the factors. We may conclude, therefore, that at any given moment the returns to one or more of the factors employed in agriculture have passed beyond the point of maximum returns, and also that agriculture is on the verge of increasing costs.

This conclusion is very similar to that at which the eminent agriculturists quoted by Mr. Kerr have arrived, though their reasons for so doing are rather different. But Mr. Kerr has stopped short at this stage of the argument, assuming that there is nothing further to be said. In fact, however, the most important conclusion lies beyond this stage. We are concerned not so much with what happens at any particular moment, but with the trend shown during a period. Now it is obvious that although at a point of time agriculture is in a state of decreasing returns, over a period its returns increase and its costs decrease.

In the period 1800 to 1900 the entire costs plane was lowered and the entire returns plane raised. It costs less to produce a bushel of wheat to-day than it did in 1800, and the return to an hour's labour in agriculture is greater now than it was a century ago. The causes of this change include progress in the arts and crafts, the accumulation of capital and the expansion of markets (see Allyn Young, "Increasing Returns and Economic Progress," *Economic Journal*, 1928, also the costs controversy in the same journal, 1926-7). To say, as Professor Venn apparently does, that any widespread evasion of the law of diminishing returns is unthinkable, is to believe that instantaneous or short-period petrification is the essential and constant aspect of our society, while long-period progress is temporary and exceptional. Or, to quote a famous Russian political scientist, "This is equal to saying that the stopping of trains at stations represents the universal law of steam transport, while the motion of trains between stations is a temporary tendency which paralyses the operation of the universal law of stopping."

D. V. GLASS.

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The Galton Lecture

To the Editor, Eugenics Review

SIR,—Professor Carr-Saunders' Galton Lecture will have given many eugenists food for thought. Especially valuable was his suggestion that our *Society* could act as a co-ordinating agency whereby the activities of many unconnected social organizations could not only be brought into closer contact, but also given that eugenic tendency which they now almost wholly lack. It is valuable because so much might be accomplished with the expenditure of such a comparatively small amount of money and effort.

If we can once convince people that every social question, from housing to education, from taxation to public health, has of necessity a biological aspect, we should be in a fair way to canalize, in the direction which we think desirable, much of that vast amount of interest and energy which is expended on the reform of abuses and the betterment of social conditions, but for the most part now without any realization of its long-term bearings upon quantity and quality of population.

He is also without question right in saying that now, when population problems are inevitably about to become matters of popular concern and political importance, is the time to take action. If we do so, we can lead opinion; if not, we shall find opinion crystallizing in dangerous forms under the influence of ignorance and prejudice, and resisting all attempts at rational guidance.

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The Problem of Maternal Mortality

To the Editor, Eugenics Review

SIR,—I am invited to reply to Lady Williams's criticism in your April issue of my article in the January issue. While I do not wish to take refuge in the assistance of my medical friends, I gratefully acknowledge that your editorial notes provide some answer to Lady Williams's indignant castigation. It is not alone among the corroboratory letters and articles I have received from medical men who generally belong, perhaps inevitably, to the faculty in which I would expect most opposition or attempted refutation.

Since Lady Williams finds my *résumé* "so startlingly provocative, both as regards the statements made and the conclusions drawn," and has no doubt that abler pens than hers will reply, she may be interested in the observation I recently received in a letter from Dr. Charles Herrman of New York, whose paper on Maternal Mortality Rate (*American Medicine*, New Series, 1933, 27,

No. 6) was unknown to me when I wrote my article. "The New York Academy of Medicine recently appointed a Committee to investigate. Several obstetricians in this country have written on the subject, and so far as I know nearly all agree that physicians are principally to blame—insufficient ante-natal care and unskilful (not technically unskilled) conduct of labour, but nothing is said about the possibility that the mother may be a poor risk: I believe your paper, coming from an unbiased observer, will help to place more justly the responsibility where it belongs."

With Mr. Porter's plea that the interest and collaboration of the stock-breeder should be enlisted in this symposium I entirely agree, and that it may lead to the holding of another conference and inquiry on wider and more scientific lines, as advocated by Mrs. Grant-Duff in your correspondence columns, is devoutly to be hoped for. Obstetrics and eugenics, after all, are not the only subjects where "the interest in what is true ceases as it guarantees less pleasure."

Lady Williams does nothing to cast scientific doubt upon the results of my demographic investigation or upon the conclusion, which she so lightly stigmatizes as a "most palpably incorrect statement," that meddlesome midwifery and the whole group of factors which favours the survival of the defective against the sturdier stocks provides a high incidence of maternal mortality. Criticism of the demographic method of investigation can have little relevance or validity unless the method is understood and unless scientific criteria are applied in verifying its results. While I make no claim that the data are complete, I do claim that no data have been produced to invalidate my thesis.

An outline of the statistical marshalling of the material for study can be presented in the following way and forms the basis of the investigation I have undertaken:

I. Internal Group Variations.

Comparative rates of group variation within a population in the same registration area: urban, rural, social, economic and racial groups, and the age-groups of mothers.

With regard to the last category—age-groups of mothers—Dr. Woodbury's analysis of 11,463 maternal deaths in relation to order of pregnancy has brought out very clearly that the maternal death-rate increases in later pregnancies and with the age of the mother. An investigation of the city of New York maternal mortality, 1929, gives the following rate: 20-24 years, 3·8; 25-29 years, 3·62; 30-34 years, 6·18; 35-39 years, 10·05; 40-44 years, 10·17. (Ref. Herrman.)

II. Time Factor Variations.

Comparative rates within a time period—comparison of rates of decrease and increase.

III. World Variations.

(*a*) Chronological.
(*b*) Contemporaneous.

Comparative rates between populations in different registration areas.

(*a*) Variations in tendency.
(*b*) Synchronized rate over same annual period.
(*c*) Synchronized rate in selected groups compared from different national registration areas.

IV. Clinical Analyses; Comparative Incidence of Direct and Indirect Causes.

Comparative incidence of direct and indirect or associated causes of maternal deaths: grouping puerperal sepsis, puerperal hæmorrhage due to various causes, toxæmias of pregnancy, etc.; associated causes of death and rates associated with forceps deliveries, Cæsarean section, etc.

V. Correlations: Association of Inverse Maternal and Infant Death-Rates; Comparative Cancer Rates and Death-Rates in Pulmonary, Cardiac, etc., groups.

Comparative inverse correlations or corresponding rates between maternal and infant death-rates, and maternal and other morbidity or mortality rates in: (*a*) group; (*b*) national; or (*c*) international rate.

For example I have laid a great deal of stress upon an apparent inverse maternal and infant mortality rate. A high cancer rate is frequently associated with a high maternal mortality rate. The following illustrative example supplied by Dr. Herrman I have not previously quoted.

Taking eight States of U.S.A., 1928-30:

MATERNAL MORTALITY RATES

Arizona	4·8	4·6	4·7
California ...	5·6	5·2	5·3
Pennsylvania ...	5·8	5·8	5·6
Labraska ...	6·0	5·4	5·3
Ohio	6·2	6·6	5·5
New York ...	6·4	5·5	5·6
Virginia	7·5	6·5	6·6
Tennessee ...	8·2	8·1	7·9

INFANT MORTALITY RATES

Arizona	143	129	121
California ...	62	63	59
Pennsylvania ...	72	70	67
Labraska ...	54	48	47
Ohio	66	68	58
New York ...	65	64	61
Virginia	76	74	71
Tennessee ...	78	75	71

It is clear that in making comparisons even in the same registration area over a three-year period no single factor can be held to be the sole determinant and that the connection, if admitted, between the maternal mortality rate and the infant mortality rate is subject to a time-lag of at least some twenty years, during which the further complication is introduced of immigrant and emigrant

changes in the composition of the population. Moreover, crude rates must very imperfectly reflect the significance of the internal group variations. Nevertheless it will be seen that during the three-year period selected maternal mortality was lowest in Arizona while this State had the highest infant mortality rate. The low maternal mortality rate in Arizona can, at any rate, not be ascribed to pre-natal care nor to more skilful obstetrical treatment in a population which shows the highest rate of infant mortality, but must relate principally to the constitutional qualities of the stock which has a high selective and elimination rate.

The generally observed tendency for reduction in puerperal sepsis as a cause of maternal death without a corresponding reduction in the total maternal mortality rate gives very little scientific encouragement to the repeatedly expressed official demand for development of the maternal service on urgent grounds of public health. (Cf. Ministry of Health Circular 1433, October 10th, 1934.)

With regard to the argument that the constitutional qualities of parturient mothers in England and Wales are below the standards of women in more primitive communities where the infant death-rate is generally high and the maternal death-rate generally low, it remains a fact whatever conclusions may legitimately be drawn from it.

The maternal death-rate in the white population of New Zealand, where most attention has been given to ante-natal care and obstetrical services, remains a high one, though the infant death-rate was, for a long period, the lowest in the world. The reverse was true of the old Maori population. As the late Elsdon Best, leading ethnographer of the Maori people, was able to show, the natives possessed a very complete ritual in connection with menstruation, pregnancy, suckling and care of the young. (Ref. "Lore of the Whare-Kohanga," *Journal of the Polynesian Society*, Vol. XV.)

Disorders such as dysmenorrhœa and particularly amenorrhœa were extremely rare amongst native women, though said to be much more frequent amongst the half-breeds. The natives of the Tuhoe tribe stated that their women have much more trouble in menstruation than they used to have and connected it with the increasing lack of fecundity noticeable among the full-blooded tribes. Accidents of pregnancy and lactatory troubles became common and sterility was increasing. Abortion was rare though, according to native belief, could be induced by magical means such as the deliberate violation of a personal *tapu*. Induced abortions appear very seldom to have been attended by any serious consequences. According to Best, a most reliable authority, "among native women giving birth is by no means the ordeal that it is to European women. It is surprising to white people to note how little fuss the former make over the matter, and how little it affects them in regard to the performance of their various labours. I have often seen a woman go aside into the bush alone, and shortly after return with her new-born child washed and wrapped up in one of her garments."

A native woman never lies down when in labour like a white woman but kneels on the ground holding on, if alone, to two stakes driven into the earth, or when she has an attendant to the knees of her attendant, who squats down before the woman. The kneeling woman has her knees apart and places an old garment to receive the child. When there is difficulty in parturition the attendant in the squatting position presses her bare knees with a downward motion on the stomach of the labouring woman to aid expulsion.

Among some of the sea-board tribes of the south coast of New Guinea the mother, the day after the birth, places the placenta in an earthenware pot and, wading shoulder-high into the sea, casts the pot with its contents into the water.

European obstetrical reforms and the increasing hybridization of the New Zealand Maori stock have only succeeded in promoting an increase in the accidents of pregnancy, in difficult labour and in the toll of maternal deaths.

GEORGE PITT-RIVERS.
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*** The purpose of the editorial notes referred to (April 1935, p. 8) was to draw attention to some of the problems of maternal mortality that still need investigation. Conferences and discussions on the causes and prevention of maternal deaths are useful in exact proportion to their capacity for supplying or interpreting facts. There is nothing more to be gained from the exchange of fervent convictions on the subject.—ED.

Cause and Effect

To the Editor, Eugenics Review

SIR,—Judging from the review in your last issue (page 56) of Dr. Unwin's book *Sex and Culture*, it seems that the learned author may believe that the obvious connection between civilization and sexual starvation proves that the former is caused by the latter.

Could it be the other way round?

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